

REMARKS

Claims 50-54 and 59-72 are currently pending. Applicant respectfully requests that the Examiner reconsider all rejections in the outstanding Office Action in view of the foregoing amendments and the following remarks.

1. Drawings

The Office Action requests that Applicant furnish a drawing under 37 C.F.R. § 1.81 in order to depict the claimed system. Applicant submits herewith a drawing and corresponding amendments to the specification in order to better facilitate understanding of the invention.

2. Currently Amended Claims 51 and 53

Dependent claims 51 and 53 have been amended to better describe the claimed invention. Particularly, the term “light signal” in claim 51 has been changed to “light energy” to be consistent with the antecedent basis established in original independent claim 50. Claim 53 has been amended to replace the limitation “directionally transferred light energy comprises a photon” with “conversion means comprises a supramolecular light-absorbing structure.” Support for this amendment is found at least at page 6, line 10 and page 12, line 13. No new matter has been added by these amendments.

3. 35 U.S.C. § 102

Claims 50-53 are rejected under 35 U.S.C. 102(b), as allegedly being anticipated by U.S. Patent No. 5,037,615 to Kane. Office Action, page 3. Particularly, the Office Action alleges that in accordance with the specification the “conversion means” recited in independent claim 50 operates to excite a first fluorophore, which excitation emission effects excitation of a second acceptor fluorophore. *Id.* Since the tethered energy transfer pair of fluorophores in Kane operates in this manner, the indicator composition of Kane is urged to fully anticipate the claimed conversion means. *Id.* Applicant respectfully disagrees and traverses this rejection on the following grounds.

For convenience, original claim 50 is repeated as follows.

50. A system for processing a light signal comprising:
conversion means for receiving ultraviolet or visible light and
directionally transferring light energy of said light and
processing means for receiving and processing said directionally
transferred light energy.

When an element is claimed using language falling under the scope of 35 U.S.C. § 112, 6th paragraph (often broadly referred to as means- or step-plus-function language), the specification must be consulted to determine the structure, material, or acts corresponding to the function recited in the claim. M.P.E.P. § 2111.01 (citing *In re Donaldson*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994)). The application of a prior art reference to a means- (or step-) plus-function limitation requires that the prior art element perform the identical function specified in the claim. M.P.E.P. § 2182. However, if a prior art reference teaches identity of function to that specified in a claim, then under *Donaldson* an examiner carries the initial burden of proof for showing that the prior art structure or step is the same as or equivalent to the structure, material or acts described in the specification, which has been identified as corresponding to the claimed means- (or step-) plus-function. *Id.* (emphasis in original). In order to make a *prima facie* case of equivalence, the examiner must show that the prior art element (i) performs the function specified in the claim, (ii) is not excluded by any explicit definition provided in the specification for an equivalent, and (iii) is an equivalent of the means- (or step-) plus-function limitation. *See* M.P.E.P. § 2183. One factor that will support a conclusion that the prior art element is an equivalent is: the prior art element is a structural equivalent of the corresponding element disclosed in the specification. *Id.* (citing *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)). That is, the prior art element performs the function specified in the claim in substantially the same manner as the function is performed by the corresponding element described in the specification. *Id.* (emphasis added).

The Examiner's assertion that the recited conversion means operates in the same manner as, and hence is a structural equivalent of, the tethered energy transfer pair of fluorophores in Kane is unsoundly based. As described in Applicant's specification at page 6, line 10, the claimed "conversion means" preferably comprises a phycobilisome. A phycobilisome is defined as a supramolecular light-absorbing structure comprising at least one phycobiliprotein-containing rod. Applicant's Specification, page 8, lines 22-23. Phycobilisomes contain two or more phycobiliproteins specifically connected by one or more linker polypeptides, where the two or more phycobiliproteins are in a particular orientation dictated by the linker polypeptide, with the orientation typically facilitating energy transfer between the phycobiliproteins. *Id.* at page 8, line 28 to page 9, line 2. Kane is directed toward a fluorescence energy transfer indicator that includes a membrane or plug 19 having a tethered pair fluorescence energy transfer indicator

comprising a fluorescent energy donor and a colorimetric indicator acceptor. *See Kane*, abstract and col. 5, 11. 47-58. Kane teaches using a small molecule fluorescent dye as the fluorescent energy donor. *See Id.* at column 4, lines 44-66. No teaching is provided with respect to the use of supramolecular structures such as phycobilisomes. Clearly, Kane's fluorescent dye has a substantially different structure than that of a phycobilisome, *i.e.*, a supramolecular light-absorbing structure comprising at least one phycobiliprotein-containing rod.

Applicant notes that Kane's tethered pair fluorescence energy transfer indicator does not directionally transfer light energy in substantially the same way as a phycobilisome. Directional energy transfer within phycobilisomes occurs from one or more "sensitizing species" to a terminal acceptor. Applicant's Specification, page 7, line 23-24 (emphasis added). The light-harvesting properties of phycobilisomes depend on an intrinsic structural and functional "sidedness," meaning that photons are collected from one "side" (*i.e.*, peripheral rod(s)) and re-emitted from a second "side" (*i.e.*, the terminal acceptor). *Id.* at page 49, lines 23-29. This distinct and useful property is absent in Kane. For example, Kane's fluorescent dye *per se* lacks any type of intrinsic directional energy transfer property, as it is well understood that a dye fluorophore can emit a photon in any direction spontaneously.

Claims 51-53 are not anticipated by Kane at least because they depend from independent claim 50.

Applicant respectfully submits that the instant rejection is improper and requests that the Examiner withdraw the rejection of claims 50-53.

4. 35 U.S.C. § 103

Claim 54 is rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over U.S. Patent No. 4,857,474 to Waterbury *et al.* ("Waterbury") in view of U.S. Patent No. 4,707,454 to Hendrix. Office Action at page 4. Particularly, the Office Action asserts that Waterbury teaches or suggests all the limitations of claim 54 except for the particular optical structure utilized to produce the emission spectra of phycobilisomes. *Id.* In an attempt to cure such a deficiency, Hendrix is introduced as disclosing an apparatus suited to illuminating and monitoring fluorescent emissions for phycobiliproteins, which includes a light source and detector communicating with the fluorescing material via optical fibers. *Id.* at page 5. Applicant respectfully disagrees and traverses this rejection on the following grounds.

Waterbury, either taken alone or in combination with Hendrix, fails to teach or suggest a “conversion means [comprising] a phycobilisome” as recited in claim 54. Waterbury provides a group of phycobiliproteins, *i.e.*, the constituents of phycobilisomes, useful as fluorescent moieties in conjugates. Waterbury, col. 4, ll. 33-37 and Example 1 at col. 7, line 45 to col. 10, line 62. Hendrix teaches fluorescent chlorophyll-labeled assay reagents. *See* Hendrix, abstract. Neither reference teaches the use of intact phycobilisomes (described in the instant specification at page 8, line 28 to page 9, line 2) as a conversion means for receiving ultraviolet or visible light and directionally transferring light energy of said light.

Applicant respectfully submits that the instant rejection is improper and requests that the Examiner withdraw the rejection of claim 54.

4. New Claims 59-74

Claims 59-74 have been added to better describe the claimed invention. Support for these claims can be found in Applicant’s specification at least at page 8, lines 22-29; page 16, lines 20-29; and page 49, lines 23-29. No new matter has been added by these new claims.

New claims 59 and 60 are patentable over the cited art at least because they depend from independent claim 50. *See* Remarks §3, *supra*.

New independent claims 61 and 71 respectively recite a “conversion means includes a structure comprising a phycobilisome” and a “supramolecular light-absorbing structure includes a structure comprising a phycobilisome.” Applicant respectfully submits that the cited references, either taken alone or in combination, fail to teach or suggest the use of intact phycobilisomes. *See* Remarks §3, *supra*. Accordingly, independent claims 61 and 71, and all claims dependent therefrom, are patentable over the cited art.

New independent claim 73 is provided as follows.

73. A biotransducer comprising:
a transducer, and
a supramolecular light-absorbing structure functionally coupled to said transducer, wherein said supramolecular light-absorbing structure has an *intrinsic structure adapted to receive ultraviolet or visible light and directionally transfer light energy of said light.* (emphasis added).

Applicant respectfully submits that the cited references, either taken alone or in combination, fail to teach a “supramolecular light-absorbing structure [having] an intrinsic structure adapted to receive ultraviolet or visible light and directionally transfer light energy of said light” as recited

in claim 73. *See* Remarks §3, *supra*. Accordingly, independent claim 73 and claim 74, which is dependent therefrom, are patentable over the cited art.

CONCLUSION

Applicant respectfully submits that this application is in condition for allowance, and such disposition is earnestly solicited. Should the Examiner believe anything further is desirable in order to place the Application in even better condition for allowance, the Examiner is invited to contact the Applicant's undersigned representative.

No fee is believed to be necessary for the entry of this Reply. In the event that a variance exists between the fee determined by Applicant and that required by the U.S. Patent and Trademark Office to enter this Reply or to maintain the present application as pending, please charge or credit such variance to the undersigned's Deposit Account No. 50-0206.

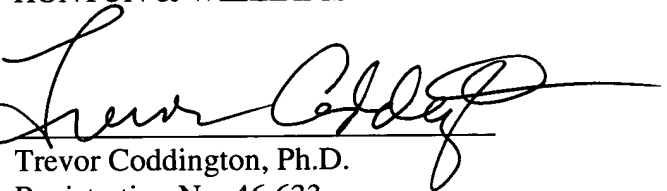
Respectfully submitted,

HUNTON & WILLIAMS LLP

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Hunton & Williams LLP
Intellectual Property Department
1900 K Street, N.W., Suite 1200
Washington, DC 20006-1109
(202) 955-1500 (telephone)
(202) 778-2201 (facsimile)

By:



Trevor Coddington, Ph.D.

Registration No. 46,633

For: Laurence H. Posorske

Registration No. 34,698